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Agroecology for resilient and sustainable livelihoods of natural disaster affected communities in Myanmar

Lessons from the STRONG project approach to farmer field schools (FFS) in Chin State and Sagaing Region

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Executive summary

Rural people in South-East-Asia have, for centuries, adapted their livelihoods to cope with natural disaster risks. But climate change and transitions from traditional to industrial modes of farming have changed the vulnerabilities of these people and their communities. Farm reliant households, in Myanmar and across the region, are increasingly exposed to market forces and disruptive impacts of extreme weather events. New approaches to rural development, which enable communities to build resilient and sustainable livelihoods are therefore needed.

The STRONG project's approach to farmer field schools (FFS), promoting agroecological practices for poor, rural households in western Myanmar, is an example of such approaches. In 2016, Ar Yone Oo – Social Development Association and Welthungerhilfe partnered to initiate the STRONG project – in response to severe landslide and flooding events that devastated rural communities in Myanmar during the 2015 Monsoon season. The project supports disaster affected households to recover their livelihoods and build long-term resilience, through a portfolio of complementary disaster risk reduction and rural development interventions.

This brief (i) provides an introduction to the STRONG project approach to adult learning in FFS, (ii) documents agroecological practices that the initiative promotes in target communities and (iii) presents key insight from the STRONG project for inter-organisational learning and knowledge exchange. The presentation builds on results of a collaboration between Ar Yone Oo (Myanmar) and Chalmers University of Technology (Sweden), formed to document lessons from the STRONG project implementation process, and assess project beneficiaries' experiences with promoted agroecological practices.

Research methodology

This brief is based on result of a collaborative research initiative of Ar Yone Oo – Social Development Association (Myanmar) and Chalmers University of Technology (Sweden). ALiSEA, the Agroecological Learning alliance in South-East-Asia, supported the work financially, with a small grant for the documentation of agroecological case studies.

The initiative's mixed-methods approach to inquiry combined a review of existing project documents, 11 focus group discussions in six project villages, and participatory exercises with STRONG project staff; with 20 qualitative, in-depths interviews with the project's agricultural technician and purposefully selected residents of beneficiary communities.

A structured quantitative survey, with a stratified random sample of 103 households from six project villages, provided insight into FFS learning outcomes, and barriers to the adoption of promoted agroecological practices.

Sample villages were purposefully selected to span a range of agroecological conditions across three townships in which the STRONG project is being implemented. Stratification was based on village location (upland vs. lowland) and households' engagement in FFS (participant vs. non-participant households).

Reasons to promote agroecology for disaster affected communities

Small-scale subsistence and commercial farming practices continue to sustain livelihoods in many rural communities in Myanmar, and South-East-Asia. Households in these communities have long relied on traditional farming practices – cultivating staple cereals, pulses, vegetables and tree-crops to meet their food needs. Yet, as societal and environmental conditions change, there is a growing need for innovations upon traditional farming system, to improve rural livelihoods and use agroecosystems sustainably. At the same time, rural households should find support, to meet their aspirations for food security and meaningful participation in the cash economy.

In past decades, rural households have often been encouraged to abandon their traditional farming practices, to engage in more industrial modes of farming, and thus move out of poverty. This has been a successful strategy in some parts of South-East-Asia. But upland communities often find it difficult to benefit from innovations that were originally intended for lowland areas, with fundamentally different agroecological conditions. In addition, rural development actors across the region increasingly recognise pitfalls that can be associated with industrial farming.

Agroecology

"a truly transformative agroecology aims to rebuild a diversity of decentralized, just and sustainable food systems that enhance community and social-ecological resilience to climate change" [1]

The FAO has identified ten interconnected elements of agroecology [2]:

1. Diverse production systems
2. Co-creation and sharing of knowledge
3. Synergies of agroecosystem elements
4. Resource use efficiency
5. Imitation of natural ecosystem cycles
6. Resilience of human-nature systems
7. Human and social values for sustainable livelihoods
8. Diverse and culturally appropriate diets for food and nutrition security
9. Responsible governance of land and natural resources
10. Innovative markets in a solidary and circular economy

Many rural households cannot buy expensive seed varieties, or large amounts of industrial farm inputs, such as synthetic fertilisers and pesticides. And communities who adopt farming practices that rely on access to such external inputs are vulnerable to unexpected trends in global food markets or shifting climate regimes. These farmers usually face high upfront costs to purchase inputs at the start of the farming season, which they plan to recover when they harvest and sell their crops. But price fluctuations for internationally traded cash crops, or unusual weather events, can push households into crisis, if market prices are low or harvests fail. Negative impacts of climate change, such as severe landslides and floods in the aftermath of heavy or prolonged rainfall, are anticipated to further enhance such climate related vulnerabilities of rural Asian households. There is thus a need for alternative approaches to the conventional industrial farming model, to address rural households' vulnerabilities, and increase their ability to cope with and recover from natural disasters.

Agroecology is such an approach [1] that gains increasing recognition, because it can help to (i) improve the livelihoods and food security of rural people; (ii) enable rural communities to avoid dependence on industrial farm inputs, and (iii) increase households' resilience in the event of natural disasters. Research in Nicaragua has found that plots under agroecological management, were more resistant to hurricane impacts on farming systems, than conventionally managed plots [3].

Many agroecological approaches combine normative aims for social justice and equity, with grounding in scientific understanding of ecosystem processes [1]. This combination fits well with goals of programmes that seek to reduce vulnerabilities and improve rural livelihoods in consideration of social, economic and ecological sustainability dimensions, and the practical knowledge of rural people. Indeed, agroecological innovations often build on traditional land-use practices and collaborative work of researchers, extension staff and rural communities, who bring complementary knowledges to local innovation settings – such as FFS.

How do disaster affected communities learn about agroecology?

Farmer field schools (FFS) have become a prominent mode of adult learning about agroecology in rural development settings [2]. Joint learning through dialogue, practical

exercises and experimentation form the heart of such approaches. FFS may span one or several cropping cycles, ideally from the initial selection of seeds and farmers' preparation of plots for cultivation, until crops have been harvested and sold, or stored for subsistence use. During the realisation phase of farmer field schools, selected members of targeted rural communities meet regularly with a specifically trained extension agent, e.g. an agricultural technician, who facilitates each session.

Importantly, the role of the facilitator is not primarily to teach FFS participants about new farming practices in a conventional, top-down style. Rather, the extension worker acts as a facilitator, encouraging community members to take charge of their own learning process – through dialogue and exchange of ideas and experiences. In addition to classroom session, FFS groups usually work jointly on demonstration and experimentation plots. These plots are small sections of farmland that FFS participants set aside to try out new farming techniques, and to compare outcomes of traditional and new agricultural practices. Yet, on most of their land, farmers initially continue to manage their crops as usual. This set-up enables groups to experiment safely and to learn from mistakes and successes. Unexpected results from trials thus do not cause big impact on participants' overall yield and livelihood security.

The STRONG project developed its approach to FFS in response to extreme weather events that devastated farming communities across Myanmar during the 2015 Monsoon season. Heavy rainfall triggered severe landslides in the uplands of northern Chin State, while floods hit communities in lower lying areas in the Chin foothills and neighbouring Sagaing Region – taking lives, dislocated villages and destroying fields, or covering them in thick layers of unfertile mineral deposits.

The STRONG project responds to this situation, with a diverse portfolio of activities, thus supporting communities to cope with and recover from natural disaster impacts. This response includes the provision of commercial seeds, fertilisers, pesticides and rat poison, which enables some communities to address the outbreak of a rat plague, and quickly re-engage in farming activities, under changed agroecological conditions in lowland villages. The projects' FFS focus on the correct use of these inputs and promote agroecological

The STRONG project

Ar Yone Oo Social Development Association implements the three-year project "Strengthening The Resilience Of Natural disaster affected Groups (STRONG)" in Tedim and Tonzang Townships, in northern Chin State and Kale Township, in western Sagaing Region, Myanmar. The project is realised in partnership with Welthungerhilfe (WHH) and funded by the Federal Ministry for Economic Cooperation and Development of Germany (BMZ).

The project's backbone is its Linking Relief, Rehabilitation and Development (LRRD) approach. The project supports natural disaster affected communities to cope with and recover from impacts of severe landslides and floods that were triggered by the extreme weather events of the 2015 monsoon season, which affected rural farming communities across many regions in Myanmar. The project further seeks to increase the overall resilience of targeted communities, in the context of annually recurring flood and landslide events.

The project implements a range of complementary activities in targeted communities, including: cash for work programs; the creation of job opportunities, through rehabilitation of public infrastructure i.e., renovation of farm land, irrigation systems and public roads; provided support for the construction of latrines; small grants to engage households in off-farm income generation; the reconstruction of damaged water supply system and reconstruction of small bridges; the provision of agricultural inputs and seeds for potatoes, taro, maize, ginger, cabbage, cauliflower, sesame, rice bean, green bean, soya bean, pigeon pea, groundnut and paddy crops; FFS trainings; vegetable production trainings; the formation of village development committees, farmer and vegetable grower groups, CBDRR committees and water management committees; the construction and rehabilitation of disaster risk reduction infrastructure; hygiene promotion campaigns and CBDRR trainings.

Activities effectively target 3054 households, in 30 rural villages of three Townships in northern Chin State and western Sagaing Region: 13 villages in Tedim Township, 9 villages in Tonzang Township and 8 villages in Kale Township.

practices for healthy plant growths and soil fertility, integrated pest management, and the promotion of diverse seeds and cultivation techniques.

FFS are initialised during community meetings. Project staff first explains the FFS approach, and then recruits ten community volunteers to participate in planned FFS activities. Groups meet bi-weekly with the STRONG project's agricultural technician, for classroom sessions and practical learning on demonstration plots. Each FFS group jointly manages two adjacent demonstration plots, on farmland that the community or an individual volunteer provides. Plots are smaller than half an acre and managed in a comparative, experimental set-up. One site is managed with traditional practices, the other with external inputs and agroecological techniques. As part of their training, participants assess and contrast the respective outcomes, at the end of the FFS learning cycle.

Image 1: *Community members in Kimlai village (Tedim) attend the closing ceremony of a completed FFS*

All groups engage with a set range of agroecological practices, learning e.g. how to make and use foliar fertilisers and natural pesticides. In addition, individual groups are encouraged to discuss their interest with the FFS facilitator, who adjusts the learning curriculum accordingly. Each group also selects one crop that FFS sessions focus on during the learning cycle. To date, FFS in subsistence oriented upland communities have thus been centred around cultivation of maize for staple consumption. Lowland communities chose to experiment with winter season cash crops, including: sunflower, groundnut, potato, green gram, tomatoes and chickpeas. In Si Thar village, participants also established four small fertilizer trial plots, to identify the most suitable product to improve the soil conditions on their flood affected paddy fields.

Closing ceremonies, at the end of each FFS training cycle, empower participants to share their insights from the learning process with other community members.

Lessons from the STRONG project

- ✓ Successful realisation of FFS requires substantial human resource investments in knowledgeable and well-trained facilitators
- ✓ Trainers require time to regularly conduct classroom sessions and FFS throughout an entire cropping cycle, and in close proximity to participants fields. This is especially important, if target communities live in very remote areas – to maximise the number of beneficiaries who can participate in offered activities.
- ✓ Groups' objectives and aspirations may differ with local contexts, which organisation can account for through flexible FFS curricula. Some communities may for example wish to increase their production of staple, subsistence crops such as maize; whereas commercially oriented participants may benefit from facilitated experimentation with cash crops, which they have not previously grown.

- ✓ Gender norms can differ substantially, even between neighbouring villages. Organisations should thus pay early attention to factors that discourage female farmers – especially widows – from participating in FFS. Gender differentiated trainings and equal representation of male and female participants in groups may foster women's participation.
- ✓ Participants are not always able to attend all FFS sessions, or to take detailed notes about introduced practices. Organisations could therefor offer basic "course books" with simple texts and sketches that farmers can keep as a reference after completion of the facilitated learning process.
- ✓ Ideally, facilitators should offer follow up group sessions in the year after completion of the FFS learning cycle. This is to address practical questions that arise as FFS participants begin to adopt new agroecological practices on their own farms.
- ✓ In the aftermaths of severe natural disasters, organisations may want to support communities with conventional inputs, alongside training about agroecological practices in FFS – thus boosting short-term farmland productivity, while agroecological techniques enable longer-term progress to favourable agroecological conditions.

Organic compost

1. Gather dead plants, leftover food, animal dung and other organic material that will naturally decompose.
2. Build-up your compost pile by layering two parts of moist, nitrogen-rich "green" materials to one part of dry, carbon rich "brown" materials.
3. Add water if the compost dries out too much. The material should neither be dripping wet, nor dry. Ideally, the moisture content should be similar to that in a pressed-out sponge.
4. The compost should be turned regularly to speed-up the breakdown of organic materials.
5. A plastic cover for your compost pile can help to capture moisture and heat.
6. Once the organic material has broken down, compost can be added to the soil – to amend it with nutrients and build-up soil organic matter.

Image 2: *A group of FFS participants in Sithar village practices to make organic compost*

Promoted practices: Agroecology for productive crops and fertile soils

Rural households in the STRONG project area produce a great share of their food through subsistence-oriented farming. Some lowland farmers additionally sell cash-cops in local markets or to regional traders. Communities' livelihoods thus strongly rely on fertile soils for productive crops and good harvests. But many households cannot afford to purchase commercial fertilisers, especially since they lost many of their assets during the 2015 natural disaster.

The land of upland farmers, who mostly rely on traditional swidden practices to restore the fertility of their cropland, was less affected by

the extreme events. But some farmers have lost entire plots to landslides, and now search for alternative ways to maintain the fertility of their soil – as the remaining cropland that they can access has become too small for rotational farming. Many households in the lowland, in contrast, struggle with thick layers of infertile mineral deposits that cover their farmland since the 2015 floods.

FFS participants are encouraged to address these challenges through the cultivation of new crops for more diverse production systems. They also learn to use agroecological inputs, including foliar fertilisers, to provide developing plants with a boost of nutrients at critical times in the cropping cycle. Organic compost is used to enrich soils with nutrients and organic matter from decomposing plant materials.

Lessons from the STRONG project

- ✓ Poor households can be reluctant or unable to make foliar fertilisers from fruits, which could instead be consumed by family members. "Siam weed" (*Chromolaena odorata*) and other wild plants can be used as a substitute for edible fruit crops.
- ✓ FFS groups may wonder how to transport foliar fertilisers to remote swidden plots. Preparation of fertiliser sprays at the site of their use can be suggested in such cases.
- ✓ FFS participants may lack access to all desired ingredients for organic compost, e.g. livestock dung. To address this challenge, facilitators can explain that households may use many different "green" and "brown" materials to make organic compost. Including "free" leave litter and grass cuttings.
- ✓ Farmers may struggle to produce large amounts of compost. Facilitators may thus encourage to apply compost selectively to high value cash crops, or home gardens to produce nutrient rich vegetables for subsistence use.
- ✓ Participants may struggle to recall exact ratios for the dilution of foliar fertiliser concentrates with water. Facilitators should thus restate this information during several different classroom sessions and translate "abstract" measures of quantities to "easy to use" units – e.g. bottle caps.

Foliar fertilisers for healthy plant growth

1. Mix two viss (1 viss = 1.63 kg) of banana flower stalks ("banana stems") with one viss of sugar.
2. Fill a large container with the combined ingredients and cover the banana-sugar mixture with water.
3. Cover the container with a piece of cloth to keep insects out, and place it in a warm spot, out of direct sunlight.
4. Let the mixture rest for ten days, until it has fermented into a foliar fertiliser concentrate. Thoroughly stir the mixture once daily, during this time.
5. To prepare the foliar fertiliser concentrate for application, it needs to be combined with water – at a ratio of four standard water-bottle caps of foliar fertiliser concentrate, to ten litres of water.
6. The completed foliar fertiliser can now be sprayed onto the leaves of developing crops.

Foliar fertilisers for improved blossoms and fruits

1. Mix one viss (1 viss = 1.63 kg) of chopped-up papaya fruits with one viss of sugar.
2. Fill a large container with the combined ingredients and cover the papaya-sugar mixture with water.
3. Cover the container with a piece of cloth to keep insects out, and place it in a warm spot, out of direct sunlight.
4. Let the mixture rest for ten days, until it has fermented into a foliar fertiliser concentrate. During this time, thoroughly stir the mixture once daily.
5. To prepare the foliar fertiliser concentrate for application, it needs to be combined with water – at a ratio of four standard water-bottle caps of foliar fertiliser concentrate, to ten litres of water.
6. The completed foliar fertiliser can now be sprayed onto the leaves of developing crops.

Image 3: *FFS participants in Taakzang village (Tonzang) practice to apply natural pesticides to their maize crop*

Promoted practices: Integrated pest management with agroecology

Communities in Tedim, Tonzang and Kale struggle with pests and diseases that damage developing plants and ripening crops during the growing season. At times when farmers still recover from the 2015 natural disaster impacts, pest outbreaks pose a particular threat to food security – as many households lost productive land and now grow crops on smaller areas than previously. Some lowland households can no longer bring motorised machines onto all of their plots, and thus cultivate their land less intensively than before.

The STRONG project provided conventional pesticides, to help households to cope with rat outbreaks in the flood aftermath. FFS, however, focus on the production of natural pesticides from local ingredients. This enables participants to protect their crops and reduce their dependence on commercially available, chemical pesticide that can have damaging effects on the health of local people and ecosystems.

Lessons from the STRONG project

- ✓ Use of alcohol as an ingredient for natural pesticides may, for socio-cultural reasons, be inacceptable in some communities. To identify such constraints, facilitators can enter into an early dialogue with FFS participants and suggest alternative pest management techniques.
- ✓ Some ingredients for natural pesticides may be locally unavailable or costly for poor households. Facilitators can suggest to make pesticides from a range of different ingredients, including: ginger, garlic, chilli, neem leaves, tobacco or detergent. FFS participants can thus select the most suitable ingredients for their personal circumstances.
- ✓ Participants who previously used chemical pesticides may expect that natural pesticides work similarly. Facilitators should clarify that most natural pesticides act as insect repellents and may thus not immediately kill all pest insects. Regular application throughout the cropping cycle is required.

Natural pesticides for integrated pest management

1. Combine 30 tical (1 tical = 16.3 g) of chopped-up chilis with one litre of strong alcohol and fill the mixture into a large container.
2. Cover the container with a piece of cloth to keep insects out, and place it in a warm spot, out of direct sunlight.
3. Let the chilli-alcohol mixture rest for ten days, until it has developed into a foliar fertiliser concentrate. Thoroughly stir the mixture once daily, during this time.
4. To prepare the natural pesticide concentrate for application, it needs to be combined with water – at a ratio of two standard water-bottle caps of natural pesticide concentrate, to 20 litres of water.
5. The completed natural pesticides can now be sprayed onto the leaves of developing crops, to repel pest insects.

Image 4: *FFS participants in Tuikhingzang village (Tonzang) work on their demonstration plot*

Promoted practices: Diverse seeds and spacing regimes for food security

Many project beneficiaries, especially those in the lowlands, can no longer cultivate the same crops as they used to grow before the 2015 flood. Either, because their valuable paddy land was destroyed during the natural disaster, or their village had to be relocated, or soil properties are no longer suitable for cultivation. Community members also struggle with weather events, such as strong winds or unexpected rainfall, which damage seedlings or crops before they can be harvested. But farmers may be able to seize new market opportunities, if they cultivate a greater variety of commercially interesting crops.

That is why Ar Yone Oo encourages STRONG project beneficiaries to diversify their cropping practices – to increase households' resilience to climate change impacts and expand their income earning opportunities. The project's field staff encourages farmers to suggest which crops they would like to grow in the future, and in response provides respective planting material. FFS sessions allow farmers to learn about recommended management practises, for crops such as maize, sunflower, potato or green gram. Participants trial different spacing, thinning and weeding regimes, learn how to produce and store strong seeds, and to sow crops in rows at recommended spacing intervals – to ease workloads for weeding and harvesting.

Lessons from the STRONG project

- ✓ Shifts to previously unknown crops are challenging for farmers, who have little access to extension agents or digital media that could enable them to learn about suitable markets and management regimes. Such information should thus be available early on, when new types of crops or seed varieties are being introduced.
- ✓ FFS participants greatly value the space for experimentation with new crops that their work on demonstration plots entails. But facilitators may want to advice groups in their decision making about which crop to trial during the FFS learning cycle, to avoid overly frustrating experiences with crops that are not well suited to local agroecological conditions.

Saving strong maize seeds

1. Select a group of maize plants from which you would like to save seeds.
2. Detassel (remove the male flower head) every fifth plant in the selected group.
3. This will facilitate cross pollination for vigorous seed development, and direct energy towards the developing seeds on the female flower heads.
4. These are the flower heads from which you will eventually harvest strong seeds for the coming cropping season.
5. Let your selected seeds mature fully – past the normal stage for fresh consumption – before you remove them from the plant for drying and storage.

Recommended crop spacing regimes

Maize: 2 feet 6 inches between rows, 9 feet in rows

Sunflower: 2 feet between rows, 9 feet in rows

Potato: 2 feet 6 inches between rows, 9 feet in rows

Green gram: 7 feet between rows, 4 feet in rows

Key insight from the STRONG project in western Myanmar

Ar Yone Oo's STRONG project approach to FFS supports communities in northern Chin State and western Sagaing Region, to recover from severe impacts of landslides and floods that were triggered by extreme weather events during the 2015 Monsoon season. The project works towards reduced household vulnerabilities, and for long-term resilience of local agroecosystems and livelihoods. Ar Yone Oo's approach combines the provision of conventional farm inputs with adult education about agroecological practices in FFS. Key insights from the realisation of these activities can inform the conception and implementation of similar agroecological initiatives, for disaster affected communities in Myanmar, and across South-East-Asia.

Key insights from the STRONG project

- ✓ Practical exercises on demonstration plots are a core part of the FFS approach, and very important for participants' experimental learning in a "failure safe" environment. Observations of successes on demonstration plots and with individual small-scale trials, are important for households' decisions to adopt promoted agroecological practices.
- ✓ For a range of social and economic reasons, not all households can participate in all FFS sessions. And not all participants are able to remember, or record in writing what they learn during FFS classes and practical exercises on demonstration plots. Agroecological initiatives may thus want to invest in the provision of simple "course material" e.g. short texts and sketches that can be distributed to class participants, as a durable reference. Such a documentation of promoted agroecological practices can also facilitate inter-organisational learning and knowledge exchange.

- ✓ Socio-economic and environmental conditions across villages and households may differ greatly, even within a project area of limited geographic extend. Some project beneficiaries may aspire to increase their farm output, to realise increased income from the sale of cash crops. Other households primarily strive to secure enough food to meet subsistence needs. A differential and targeted approach to the promotion of agroecological practices is thus required, to identify suitable practices that meet the needs and objectives of specific households.

- ✓ Alterations of agroecological conditions in the aftermath of natural disasters, such as the devastation and loss of fertile farmland in the case of some STRONG project communities, can be so severe that agroecological initiatives may want to provide conventional farm inputs and respective training – to help households cope in a situation of immediate crises. Agroecological practices can be promoted at the same time, towards long term reductions in households' vulnerabilities. The STRONG project exemplifies such an approach.

- ✓ Common barriers to the adoption of agroecological farming practices, across STRONG project villages and households, include the unavailability, or social unacceptability (in the case of alcohol) of specific ingredients for the production of e.g. foliar fertilisers or natural pesticides. Agroecological initiatives may thus want to invest time into the identification of a wide range of locally available, and socially acceptable ingredients and methods to achieve certain agroecological objectives. They can then promote a portfolio or "toolbox" of practices, rather than single strategies, that beneficiaries can choose from.

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